

ABSTRACT

An in-line production apparatus and a method for composition control of copper indium gallium diselenide (CIGS) solar cells fabricated by a co-evaporation deposition process. The deposition conditions are so that a deposited Cu-excessive overall composition is transformed into a Cu-deficient overall composition, the final CIGS film. Substrates with a molybdenum layer move through the process chamber with constant speed. The transition from copper rich to copper deficient composition on a substrate is detected by using sensors which detect a physical parameter related to the transition. A preferred embodiment sensors are provided that detect the composition of elements in the deposited layer. A controller connected to the sensors adjusts the fluxes from the evaporant sources in order provide a CIGS layer with uniform composition and thickness over the width of the substrate.